

Schoener
To... Weisberg
Hoch

11 March 1970

I write this in reply to ~~say~~ something in Gary's ~~to~~ 7 March letter to Harold. Each of you have a copy of it.

Gary's remark: "The smoke on the knoll...is not very easy to explain, unless one postulates the use of some sort of firecracker rather than a rifle. If someone has a good explanation for the smoke-- that much smoke (remember, they could see it on the overpass which is not ~~that~~ that close)-- I'd like to hear it so I could set my mind at rest on this wild idea."

I write this chiefly as a rebuttal to the assertion that modern rifles cannot produce large quantities of smoke when they are fired-- I mean a quantity of smoke that is readily visible from as much as 200 yards or more away. Do not consider it necessarily as my notion of what caused the smoke on Dealey Plaza, but do consider it my reason for not excluding the possibility that the smoke was caused by the firing of a modern rifle.

First of all, dispell from your mind that the so-called "smokeless" gunpowders that presently are produced are in fact smokeless. The fact is that they emit less smoke than their predecessor, which is called black powder. The amount of smoke is much less than with blackpowder (in a moment ~~you~~ you'll learn why), but there is always some. However, under normal shooting conditions the ~~amount~~ amount of smoke produced by modern rifles is slight enough virtually to justify the term "smokeless".

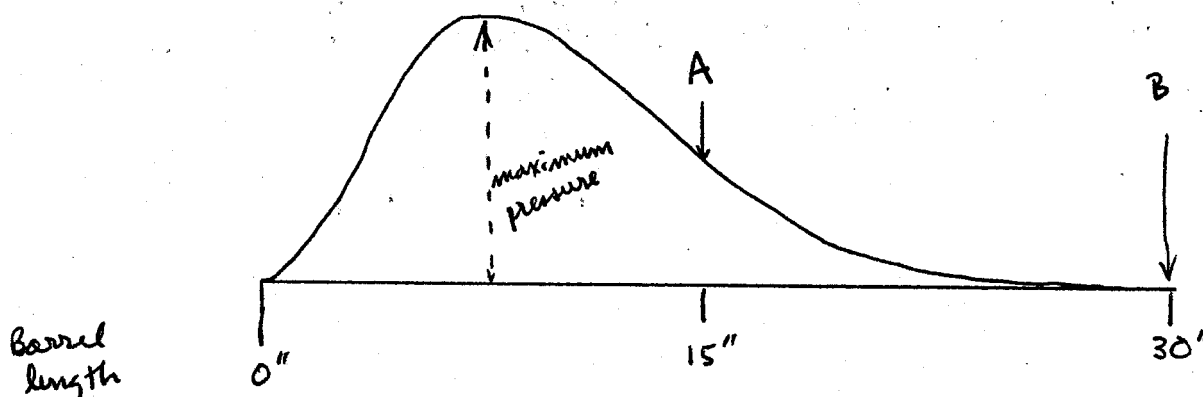
There is an abnormal shooting condition which invariably causes modern rifles to emit a great quantity of smoke. This would occur if the barrel of a normal high powered rifle were cut back to an abnormally short length-- a sawed-off rifle.

Different gunpowders have different rates of ~~burning~~ burning; some burn off very quickly, while others take a relatively long time. Thus quick burning powders are used in handgun ammo, so ~~that the powder will burn off completely before the bullet~~ that most of the powder burns off before the bullet has left the short barrel. Relatively slow burning powders are used for ~~rifle~~ rifle bullets, however; the bullet has a long way to travel down the barrel, and the shooter wants to have power exerted on the bullet during the whole time that it is in the barrel. The pressure on the bullet results from the expansion of the gasses that are released by the burning of the gunpowder.

Now if a rifle cartridge is fired in a sawed off rifle-- a cartridge that was designed for use in a long barreled rifle, then the powder does not burn off completely before the bullet leaves the barrel. The burning (but still not completely burned) powder follows the

bullet out of the barrel and continues burning in the open air, in the area in front of the muzzle. The smoke results from the inefficiency of this kind of burning-- the powder does not burn as hot or as fast as it's supposed to. The situation is comparable to campfires. If you burn a lot of small dry stick, the fire produces little or no smoke, since the burning is very intense and complete. But if you burn damp wood, or wood that otherwise does not burn hot and fast, then much smoke is produced, since the burning is not complete.

The pressure produced by burning gunpowder is initially very great after the moment of ignition, but it gradually tapers off to nothing. If the barrel length is great enough so that the burning ends before the bullet leaves the barrel, then the rifle will produce little or no smoke. If the barrel is short, and the burning is not complete, then there will be a lot of white smoke. The pressure curve after ignition looks something like this:



If you fired a rifle with a 30" barrel, the powder would burn off by the time your bullet reached point "B", and there would be no smoke emitted from the muzzle. If your barrel were 15", then all the burning that normally would take place inside the long barrel between points "A" and "B", instead takes place in the air in front of the muzzle. Your 15" barrel would produce smoke.

How much smoke would be produced depends of more factors than I can describe here. The chief factors would be cartridge and barrel length: (using identical cartridges) the shorter the barrel the more smoke; (using identical barrel lengths for different calibers) the more powerful the cartridge, the more smoke. Type of powder also figures importantly-- must be rifle powders (slow burning).

I'm writing fast and may not be entirely clear, but I hope this explains it sufficiently. I want only to establish that there is this condition under which a modern rifle can be made to produce a large quantity of white smoke. Must stop now. If you have questions, write.

Dick